A DESCRIPTIVE SURVEY OF THE RANGE OF INJURIES SUSTAINED AND FARMERS' ATTITUDES TO VULVA BITING IN BREEDING SOWS IN SOUTH-WEST ENGLAND

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Final Acceptance: 25 November 1999

Abstract *Animal Welfare 2000, 9:* 273-280

The within-farm prevalence of vulva biting in breeding sows in south-west England was investigated using a postal survey sent to 410 pig farmers in January 1997. The response rate was 65 per cent and there were 83 useable replies. The majority of farms where vulva biting was reported indicated a low within-farm prevalence of 1–9 per cent of sows affected, although prevalences as high as 30–60 per cent were reported. The injuries reported ranged from bleeding to removal of the whole vulva, the most commonly reported injuries being bleeding and superficial damage to the vulva. No long-term effects from this injury to service and dry sows were reported by 70 per cent and 76 per cent of farmers respectively. Competition for food, aggressive sows, closeness to farrowing and mixing of sows were the most common reasons suggested by these farmers as causes of vulva biting.

Keywords: *animal welfare, sow, vulva biting*

Introduction

A vulva bite occurs when one sow bites another's vulva and usually results in a deep cut – but can be as severe as removal of the whole vulva (Van Putten & Van De Burgwal 1990). The wound usually bleeds profusely, localized swelling occurs and the risk of infection is high (Van Putten & Van De Burgwal 1990). Although vulva biting is regarded as an aggressive act, the bitten sow rarely retaliates aggressively (Van Putten & Van De Burgwal 1990). Once a sow has been bitten, the likelihood of being bitten again is increased, possibly due to the smell of the blood or the swelling that occurs following a bite (Van Putten & Van De Burgwal 1990). A within-farm prevalence of 30 per cent was reported by De Koning *et al* (1987) in groups of sows fed via electronic sow feeders. However, vulva biting is not restricted to groups of sows using electronic sow feeders: it has been reported in sows on liquid feed and in loose-housed sows fed in individual stalls (Olsson *et al* 1993). It has also been associated with partially slatted floors (Kroneman *et al* 1993). Rizvi *et al* (1998) reported an increased risk of vulva biting in association with group housing, increased group size, keeping a boar in the same pen as the sows, electronic sow feeders, feeding once daily,

providing water automatically and a high number of sows per drinker. Despite the severity of injuries that can occur and concern about the future reproductive implications of a vulva bite, there is no published information on whether farmers consider vulva biting to be a serious welfare problem or on its impact on reproduction in breeding sows.

The *Welfare of Livestock Regulations 1994* (GB Parliament 1994) banned the construction of tether and stall accommodation in the United Kingdom, and from 1 January 1999 all pregnant sows have been loose housed. Sows kept in tether systems suffer from chronic stress which may be partially due to unresolved aggression between adjacent sows (Barnett *et al* 1984). Thus, tethers and stalls have been perceived as housing systems which infringe excessively on a sow's welfare. However, loose housing of sows is not without complications and can lead to increased lameness and aggression, including vulva biting (De Koning *et al* 1987).

There is very little information on vulva biting in breeding sows, despite the evidence that it is an important welfare problem in group-housed sows (Van Putten & Van De Burgwal 1990). Rizvi *et al* (1998) reported that 70 per cent of farmers had seen sows with vulva bites on their farm. The prevalence of vulva biting at the time of questionnaire response was 29 per cent and 48 per cent among service and dry sows respectively. This paper reports, from the same survey, the within-farm prevalence of vulva biting in breeding sows in south-west England, the range of injuries sustained and the farmers' attitudes to this problem in order to establish how important vulva biting is in regard to the sows' health and welfare.

Methods

The details of the postal questionnaire are discussed elsewhere (Rizvi *et al* 1998). Briefly, a 9-page questionnaire, covering letter and stamped return addressed envelope, were sent to 410 pig farmers located in south-west England. Two reminders were sent to non-respondents, a postcard reminder followed by another questionnaire.

The questionnaire contained questions on vulva biting in service sows (sows that had been weaned and were in a service house or paddock) and dry sows (sows which were presumed or diagnosed pregnant), on housing, feeding management, herd type and production figures.

The data were loaded into a database (Access® Version 2.0, Microsoft Corporation, Redmond, USA) and a simple analysis was performed using Epi Info 6 (Dean *et al* 1994).

Results

Prevalence

The final response rate was 65 per cent (266 replies), of which 83 replies were useable. Three farms were nucleus units, 5 were multiplier, 17 were breeder/weaner, 55 were breeder/finisher and 3 respondents failed to give herd details. Vulva biting was reported on 58 out of 83 farms (70%). Thirty-six (43%) farmers reported vulva biting in service sows and 50 (60%) in dry sows. Of these, 29 (35%) farmers reported vulva biting in both service and dry sows. Vulva biting was seen in pregnant gilts and farrowed sows on 8 (10%) farms and one respondent reported vulva biting in gilts before and during service and after farrowing.

The majority of farmers indicated that vulva biting was a sporadic problem rather than continuous; 32 out of 36 (89%) and 42 out of 50 (84%) for service and dry sows respectively. The number of outbreaks of vulva biting in the last 12 months ranged from 0–27 (median 4 and 5) and from 0–40 (median 3) for service and dry sows respectively (Figure 1). However, vulva biting was occurring on 24 (67%) and 40 (80%) farms, in service and dry

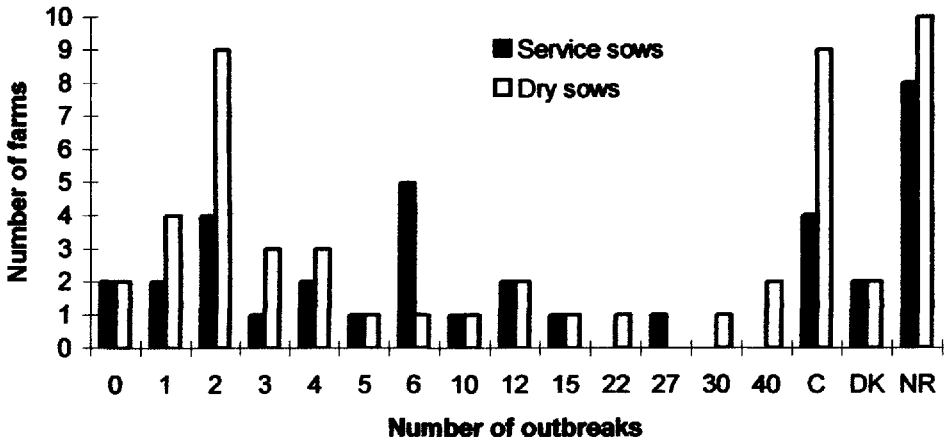

Figure 1 **Number of outbreaks of vulva biting in the last 12 months reported by farms that had ever experienced vulva biting. (C – continuous; DK – don't know; NR – no response.)**

sows respectively, at the time the questionnaire was sent, a higher level than expected from the estimated number of outbreaks per year.

The within-herd prevalence of vulva biting was 1–9 per cent for 56 per cent and 72 per cent of farms in service and dry sows respectively (Figure 2). All farmers reporting prevalences of 30 per cent and above also reported vulva biting to be a continuous rather than a sporadic problem on the farm. The proportion of aggressive sows (ie those doing the vulva biting) ranged from 1–10 per cent on all affected units.

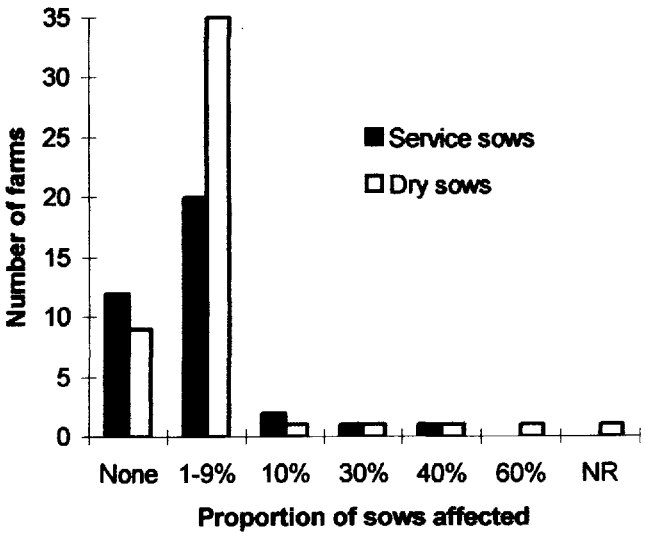

Figure 2 **Proportion of sows with vulva bites within farms. (NR – no response.)**

https://doi.org/10.1017/S0962728600022740 Published online by Cambridge University Press

Severity of damage

A full range of injuries was reported, from bleeding to removal of the whole vulva (Table 1). Among service and dry sows, bleeding (50% and 38% respectively) and superficial skin damage (28% and 38% respectively) were reported to be the most common injuries.

Table 1 Range of vulva injuries in sows.

Injury	Service sows (n = 36 farms)				Dry sows (n = 50 farms)			
	Injury		Most common injury		Injury		Most common injury	
	No farms[1]	%	No farms[1]	%	No farms[1]	%	No farms[1]	%
Bleeding	30	83	18	50	31	62	19	38
Superficial skin damage	19	53	10	28	31	62	19	38
Deep skin damage	18	50	6	17	26	52	14	28
Swelling	16	44	3	8	21	42	7	14
Removal of part of vulva	15	42	2	6	17	34	5	10
Removal of whole vulva	2	6	0	0	5	10	0	0

[1] Most farmers reported more than one type of injury.

No long-term effects following vulva biting were reported on 25 (70%) and 38 (76%) farms in service or dry sows respectively. Long-term effects in service sows included problems at mating (17%), at farrowing (14%) and vulva discharge (3%). Long-term effects in dry sows included problems at farrowing (10%), at subsequent matings (4%), vulva discharge (4%) and infertility (2%).

No deaths were reported in sows as a result of vulva biting, although one respondent was unsure. Two farms had culled bitten service sows. However, 4 (11%) and 5 (10%) farms had culled service and dry sows respectively for vulva biting.

Causes of vulva biting

Farmers suggested a variety of reasons for why vulva biting occurred in their sows (Tables 2 and 3). Aggressive sows, competition for food and mixing of sows were three out of the four top reasons in both service and dry sows. Three out of 36 (8%) farms indicated that vulva

Table 2 Reasons for vulva biting in service sows (n = 36 farms).

Cause	No of farms[1]	
	(n)	(%)
Aggressive sow	12	33
Mixing sows	9	25
Competition for food	7	19
Boar contact	3	8
Large group size	3	8
Swollen vulva	2	6
Breed of sow (Duroc x Large White)	2	6
Stress	1	3
Competition for space	1	3
Warm weather	1	3
Don't know	2	6
Sexual activity	0	0
No response	3	8

[1] Some farmers gave more than one reason.

https://doi.org/10.1017/S0962728600022740 Published online by Cambridge University Press

Table 3 Reasons for vulva biting in dry sows (n = 50 farms).

Cause	No of farms[1]	
	(n)	(%)
Competition for food	16	32
Aggressive sow	13	26
Sow close to farrowing	12	24
Mixing sows	7	14
Swollen vulva	3	6
Electronic sow feeder	2	4
Insufficient fibre in diet	2	4
Large group size	1	2
Stress	1	2
Loose sow (when individually housed)	1	2
Competition for space	0	0
Sexual activity	0	0
Boredom	0	0
Don't know	4	8
No response	4	8

[1] Some farmers gave more than one reason.

biting occurred with boar contact in service sows or was due to large group sizes. Twelve out of 50 (24%) farms indicated that vulva biting occurred in dry sows close to farrowing.

Reducing vulva biting

There were 15 (42%) and 23 (46%) farmers who had attempted to reduce levels of vulva biting in their service and dry sows respectively. Measures included spreading food further (including use of a spin feeder), removing or culling the aggressor (the sow doing the vulva biting), removing small sows, increasing the space allowance, reducing the number of times sows were mixed, mixing by size and age, providing straw, providing a plastic curtain, observation at feed time, removing unfinished feed, implementing more regular feeding routines, shutting sows in individual feeders before feeding, providing alternative feeds such as sow rolls or sugar beet pulp, increasing the daily feed allowance, nose-ringing aggressive sows, using 'antibite' sprays and separating sows due to farrow at least 7 days before parturition.

Fourteen out of 15 (93%) and 19 out of 23 (83%) respondents thought that they had successfully reduced vulva biting in service and dry sows respectively. One farmer provided straw for the sows and found this had no effect in either service or dry sows. Two farmers reported only partial success when they had implemented the following changes: provision of straw and fibre; and provision of straw three times daily instead of once daily. Two farmers did not know if their changes (culling the aggressive sow and monitoring sows regularly for signs of vulva biting) had reduced vulva biting. The most common successful method employed was isolation or culling of the aggressive sow (3/15 and 6/23 farmers for service and dry sows respectively). Most other successful methods employed were feed-related as listed earlier.

Acceptability of vulva biting

There were 18 (50%) and 27 (54%) farmers (for service and dry sows respectively) with vulva biting on their farms who considered it unacceptable. A level of 1–9 per cent was considered acceptable by 12 (33%) and 19 (38%) farmers with service and dry sows respectively. Two farmers believed 10 per cent was an acceptable level in service sows.

Discussion

This survey found that vulva biting in breeding sows is a problem encountered by most pig farmers, with 70–90 per cent of the farmers in the survey reporting vulva biting in breeding sows. It occurred particularly in their service and dry sows, although not exclusively in these groups. The higher prevalence of vulva biting in dry sows compared with service sows found in both surveys could be due to several factors: the dry period usually covers a longer time period than the service period, group sizes are often smaller for service sows than dry sows and service sows have more supervision than dry sows which have been diagnosed as pregnant.

Although the majority of farms that had ever experienced vulva biting actually had vulva biting on the farm at the time of questionnaire response, most respondents considered the problem sporadic. If the problem was truly sporadic with only three or four outbreaks per year then the prevalence reported at the time of the questionnaire was higher than expected. It is possible that the farmers underestimated the frequency of episodes or that the question was misinterpreted: ie 'sporadic' was understood to mean that individual sows were affected rather than the breeding group as a whole. Environmental factors may also have affected the prevalence, for example if vulva biting is seasonal and occurs more frequently in winter (when the questionnaire was sent); or it may be a chance finding that these farms had an outbreak at the time of questionnaire response.

The higher within-farm prevalence for the few farms where the problem was continuous may indicate that conditions on these farms were especially severe. However, this finding also supports the theory that vulva biting is a behaviour that is learned within a group (Van Putten & Van De Burgwal 1990). It has been suggested that although vulva biting may initially occur by chance, in aggressive encounters between sows, a sow soon learns the effectiveness of vulva biting to get others to move away and give her access to, for example, feed or lying spaces. The spread of the 'vice' through a group could be explained by one of the following theories. The smell of a bleeding vulva (the most commonly reported vulva damage in this survey) may attract the attention of other sows who also bite the damaged vulva, and thus the 'vice' is learned individually by each sow. Alternatively, or additionally, social transmission of the 'vice' may be observed within the group. Sows may notice damaged vulvas only after they have seen another sow engaged in vulva biting. Thus, the behaviour of a vulva-biting sow is a factor that triggers the same behaviour in others within a group via a mechanism of stimulus enhancement (Nicol 1995).

Farmers in the main survey associated vulva bites in dry sows with late gestation and in service sows with boar contact. In both these instances, biting could be associated with physiological changes in the vulva, including swelling and vaginal discharge, just prior to farrowing and oestrus respectively (Morrow 1986; Hughes & Varley 1980). These physical changes may in themselves attract the attention of other sows, or they may increase the risk of vulva damage and bleeding and thus attract the attention of other sows. However, one farmer indicated that the boars caused the vulva damage when competing for access to the feeding stall rather than during sexual activity. Risk analysis (Rizvi *et al* 1998) of the data showed a significantly increased risk of vulva biting ($P < 0.05$) for both service and dry sows where boars were kept in the same pen, which reflects the observations by the farmers.

Only 2 out of 83 farmers had culled bitten service sows. It is possible that this is an underestimate and that sows have been culled indirectly as a result of vulva biting, for example when a sow is culled after being diagnosed non-pregnant, a farmer may not remember what had happened to that particular sow 3–4 months earlier. Risk analysis of this

data (Rizvi *et al* 1998) indicated a significantly higher ($P < 0.05$) sow replacement rate (culling percentage) on farms where vulva biting was reported. More farmers had culled sows for actually causing vulva biting and used this method successfully to help reduce levels of vulva biting. This method would be effective if vulva biting is caused by a single sow who learns the effectiveness of moving sows by biting the vulva. At least half the farmers considered vulva biting to be unacceptable and this was reflected in their attempts to reduce levels of vulva biting.

Both the farmers' suggestions for why vulva biting occurred and the methods they employed to reduce the problem indicate an association with feed-related aggression and/or generalized aggression between sows. This is in agreement with Van Putten and Van De Burgwal (1990) who argued that vulva biting is an aggressive act although the bitten sow makes no attempt to retaliate. They were able to reduce the incidence of vulva biting from 30 per cent to 10 per cent in groups of 40 sows by both changing the feed routine and by reducing the total level of aggression by stimulating subgroups of sows to form within the main group. However, it is not clear whether this was a reduction in the number of vulva bites or the number of bitten sows. Risk analysis of the data (Rizvi *et al* 1998) indicated that there was a significantly higher ($P < 0.05$) risk of vulva biting on farms where once daily feeding occurred.

These findings have supported some of the theories suggested about the learning behaviour involved in vulva biting, while farmers indicated that they successfully reduced vulva biting by employing a variety of methods. However further behavioural and intervention studies should be carried out to substantiate this.

Animal welfare implications

Problems associated with group housing of pregnant sows are of importance to all pig producers who must, by law, house sows in groups in both the United Kingdom and Sweden. Within the next 15 years this will become an issue for other pig producers in Europe, such as the Netherlands and Denmark. Future changes in legislation enforcing group housing of lactating sows could result in welfare problems which include vulva biting. This potential problem needs to be investigated before any further changes take place.

This study has shown that the prevalence and severity of vulva biting in breeding sows is an important welfare issue in group-housed sows. The majority of farmers in this survey regarded vulva biting as unacceptable: this would indicate a willingness to make feasible management changes when risk factors such as frequency of feeding, group size and number of sows per drinker have been identified.

Acknowledgements

The authors would like to thank the farmers who responded to this survey and the Matthew Eyton Animal Welfare Trust for funding the residency that enabled this research to be undertaken.

References

Barnett J L, Cronin G M, Winfield C G and Dewar A M 1984 The welfare of adult pigs: the effects of five housing treatments on behaviour, plasma corticosteroids and injuries. *Applied Animal Behaviour Science 12:* 209-232

Dean A D, Dean J A, Burton A H and Dicker R C 1994 *Epi Info, Version 5.* US Department of Health and Human Services, Public Health Services, Centre for Disease Control and Prevention: Stone Mountain, USA

De Koning R, Bokma S, Koomans P and Van Putten G 1987 Praktijkonderzoek naar groepshuisvesting van zeugen in combinatie met een krachtvoersation. In: *Proefstation Voor de Varkenshouderij* p 1.14. Rosmalen, The Netherlands

GB Parliament 1994 *Welfare of Livestock Regulations 1994. Statutory Instrument No 2126.* Her Majesty's Stationery Office: London, UK

Hughes P E and Varley M A 1980 *Reproduction in the Pig.* Butterworth Group: London, UK

Kroneman A, Vellenga L, Van Der Wilt F J and Vermeer H M 1993 Review of health problems in group-housed sows, with special emphasis on lameness. *Veterinary Quarterly 15:* 26-29

Morrow D A 1986 *Current Therapy in Theriogenology 2.* W B Saunders: Philadelphia, USA

Nicol C J 1995 The social transmission of information and behaviour. *Applied Animal Behaviour Science 44:* 79-98

Olsson A C, Svendsen J, Reese D, Andersson M and Rantzer D 1993 Housing of gestation sows in long narrow pens with liquid feeding. *Rapport – Institutionen for Lantbrukets Byggnadsteknik, Sveriges Lantbruksuniversitet No 87:* Sweden

Rizvi S, Nicol C J and Green L E 1998 Risk factors for vulva biting in breeding sows in south-west England. *Veterinary Record 143:* 654-658

Van Putten G and Van De Burgwal J A 1990 Vulva biting in group-housed sows: preliminary report. *Applied Animal Behaviour Science 26:* 181-186